



FACT SHEET

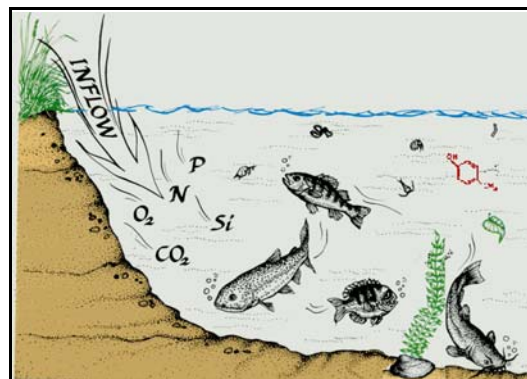
AQUATOX (RELEASE 2): MODELING ENVIRONMENTAL FATE AND ECOLOGICAL EFFECTS IN AQUATIC ECOSYSTEMS

SUMMARY

*The U.S. Environmental Protection Agency announces the availability of an enhanced version of the freshwater ecosystem simulation model **AQUATOX** which predicts the fate of various pollutants, such as nutrients and organic chemicals, and their effects on the ecosystem, including fish, invertebrates, and aquatic plants. **AQUATOX** is a valuable tool for ecologists, biologists, water quality modelers, and anyone involved in performing ecological risk assessments for aquatic ecosystems. Release 2 has enhanced scientific capabilities and analytical tools to more completely simulate and understand aquatic ecosystems. It also features improvements that make the model easier to use.*

BACKGROUND

One of the biggest challenges to protecting or restoring our Nation's waters is to adequately understand the relationships between the chemical and physical environment and the organisms that live there. Ecosystems are complex, with seasonal and annual variations and multiple interactions among species. The biological communities in many water bodies are impaired, but the causes of the impairment may not be obvious in the face of numerous environmental stressors. It is difficult to predict how the aquatic community will respond to changes in pollutants or environmental conditions with simple methods of analysis, especially if the methods address a single stressor at a time. A complex simulation model may be required.



ABOUT AQUATOX RELEASE 2

AQUATOX is a PC-based ecosystem model that predicts the fate of nutrients and organic chemicals in water bodies as well as their direct and indirect effects on the resident organisms. Most water quality models predict only concentrations of pollutants in water: they do not project effects of pollutants on organisms. AQUATOX simulates multiple environmental stressors (including nutrients, organic loadings and chemicals, and temperature) and their effects on the algal, macrophyte, invertebrate, and fish communities. Therefore, AQUATOX can help identify and understand the cause and effect relationships between chemical water quality, the physical environment, and aquatic life. AQUATOX can represent a variety of aquatic ecosystems, including vertically stratified lakes, reservoirs and ponds, and rivers and streams. Release 2 has many new features, including:

Enhanced scientific capabilities

- more complete ecosystem representation
- improved stream simulation (habitat differentiation and simulation of inorganic sediments)
- more realistic simulation of fish
- increased number of organic toxicants (up to 20) that can be modeled simultaneously
- enhanced uncertainty analysis capabilities

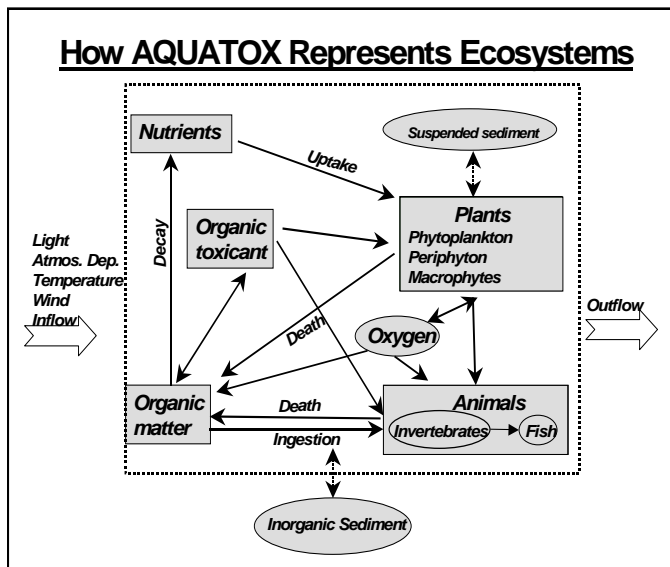
- new linkage to BASINS 3.1 -- EPA's GIS-based watershed modeling system

Enhanced user friendliness

- new study setup Wizard
- context-sensitive Help files
- expanded data libraries
- improved graphing capabilities

MANY ENVIRONMENTAL ISSUES CAN BE ADDRESSED WITH AQUATOX

AQUATOX can be used in a myriad of ways to address water management issues and programs (water quality criteria and standards, Total Maximum Daily Loads, and ecological risk assessment). AQUATOX should be considered when the user needs to understand the processes relating the chemical and physical environment to the biological community. A sample of the types of analyses that can be addressed includes:



Ecological understanding and problem analysis

- Evaluate which of several stressors is causing observed biological impairment. For example: Are nuisance levels of attached algae in streams controlled primarily by nutrients, sediments, grazing by snails, or flow conditions?
- Predict effects of pesticides and other toxic substances on aquatic life. For example: Will sublethal concentrations eventually cause game fish to disappear? Will reduction of one group of organisms reduce the food supply for other, more beneficial species, or lead to increases in nuisance species?
- Evaluate potential ecosystem responses to invasive species
- Explore how changes in land use or agricultural practices in a watershed might affect aquatic life, by using the new linkage to BASINS

Environmental Management

- Compare differences in biological responses to control alternatives
- Develop targets for nutrients in lakes and reservoirs with nuisance algal blooms
- Estimate time to recovery of fish or invertebrate communities after reducing pollutant loads
- Calculate bioaccumulation factors for organic toxic chemicals
- Estimate how long before tissue levels of toxic organics in fish will return to safe levels following removal of contaminated sediments

WHO WILL WANT TO USE AQUATOX?

AQUATOX is a valuable tool for ecologists, biologists, water quality modelers, and anyone involved in performing ecological risk assessments for aquatic ecosystems.

How to Get More Information

You can download AQUATOX Release 2 and accompanying documentation at (<http://www.epa.gov/water-science/models/aquatox/>). You will be able to get the CD and hard copy soon from the National Service Center for Environmental Publications (NSCEP) at 1-800-490-9198 or by email to ncepimal@one.net or from the Water Resources Center at 202-566-1729. You may also contact Marjorie Coombs Wellman, Office of Science and Technology, U.S. EPA, 1200 Pennsylvania Ave., NW (4305T), Washington, DC, 20460 (telephone: 202-566-0407, or email: wellman.marjorie@epa.gov)